

# State of Texas Drought Preparedness Council

2019-2020 Biennial Report

This document contains information concerning drought conditions in the state of Texas. The document is not a comprehensive report on drought conditions in each community. It was created to report state drought conditions as designated by Chapter 16 of the Texas Water Code.

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## Preface

Drought is a prolonged dry period in a natural climate cycle. It is a slow onset phenomenon caused by a rainfall deficit generally combined with other predisposing factors. Drought leads to water shortages and is likely to have a long-term environmental, economic and health impact.

Drought is a recurring hazard in Texas that causes devastation to the state's agricultural industry, depletes reservoirs, adversely impacts wildlife and provides fuel for wildfires. This biennial report serves as a summary of the overall drought conditions in the State of Texas and the accomplishments of the Drought Preparedness Council and supporting agencies.

This report includes a summary of the weather conditions for the period 2019-2020 and descriptions of indices used by the Drought Technical Assistance and Technology Committee for recommending counties to the State Drought Proclamation.

This document complies with Chapter 16, Section 2, Subchapter C of the Texas Water Code, which states that the Drought Preparedness Council, under the direction of the State Drought Manager, shall report to the legislature, not later than January 15 of each odd numbered year, regarding significant drought conditions in the state.

# Using This Document

**The Drought Biennial Report provides information on drought conditions for 2019 and 2020 to the Texas Legislature. This section explains how and where to find additional supporting information for the Biennial Report.**

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When you see a reference arrow (↗), look at the bottom of the page for a hyperlink to additional information from the State of Texas.

For an explanation of the acronyms and terms in this document please refer to the **State of Texas Acronyms and Terms (STAT) Book**.

# Overview and Purpose

**This document provides an overview of Texas drought conditions for 2019 and 2020 and the activities of the Drought Council and supporting agencies to help communities mitigate drought.**

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## Goal

Provide the Texas Legislature with a summary of the drought conditions for the State of Texas for the years 2019-2020 in accordance with Chapter 16, Section 2, Sub-chapter C of the Texas Water Code.

## Objectives

- Provide an executive summary of drought conditions.
- Report on the climate conditions for the State of Texas.
- Report on the impact of drought on agriculture.
- Report on the drought's impact on the ability of water providers to supply the water needs of Texas citizens.

## Audience

- Members of the Texas Legislature
- Drought Preparedness Council representatives
- Texas Division of Emergency Management staff
- Local Emergency Managers
- Water Providers

# Executive Summary 2019-2020

**Drought originates from a deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group or environmental sector. This executive summary describes drought conditions from January 2019 to December 2020 and the drought's effect on agriculture and wildlife.**

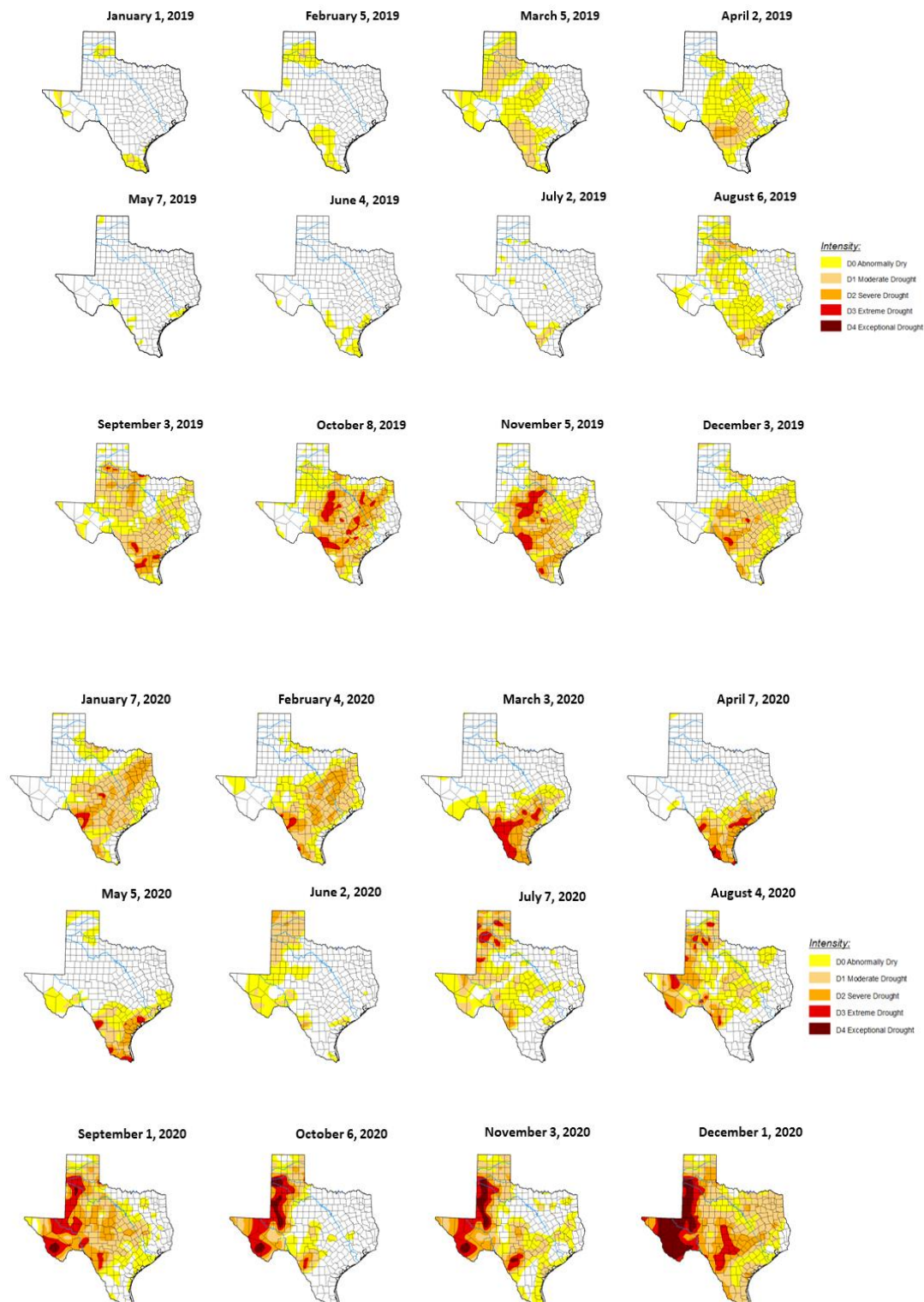
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From January through February 2019, drought conditions were limited to the northern Panhandle, west Texas and the Rio Grande Valley region, with the rest of the state being drought free. In March 2019, 54 percent of the state was under abnormally dry conditions (D0), with 20 percent of the state under moderate drought (D1) condition (Figure 1). Moderate drought conditions prevailed over much of the Panhandle, north central Texas, and along the Rio Grande Valley. By April 2019, drought had eased in the Panhandle but a pocket of severe drought (D2) had developed in the mid-Rio Grande Valley and Upper Nueces river basin. From May through July 2019 much of the state was drought free except for a pocket of moderate (D1) to severe (D2) in the Lower Rio Grande Valley. From August through October 2019, drought conditions established steadily over much of the state with extreme drought (D3) conditions appearing for the first time at the end of August 2019 and increasing steadily through October 2019. The patches of extreme (D3) drought expanded over central Texas and the mid-Rio Grande Valley in November 2019 but decreased over south central and north central Texas. By December 2019, the area under extreme (D3) had decreased considerably and drought conditions prevailed primarily over central and southern Texas.

Severe drought (D2) conditions expanded into east Texas in January 2020 and remained through February 2020. By early March 2020, drought conditions in central and east Texas had eased. However, several counties in the Lower Rio Grande Valley had severe drought (D2) extreme drought (D3) conditions. By April 2020, while the extent under these two drought categories in south Texas had decreased, a pocket of exceptional drought (D4) had developed in the Lower Rio Grande Valley. Drought conditions in south Texas decreased in May thanks to plentiful rainfall over region. By June 2020, south Texas had only a pocket of abnormally dry (D0) conditions. While the south Texas drought decreased in extent in May 2020 and the region was drought free by July 2020, drought conditions had developed in west Texas and the Panhandle. By July 2020, extreme drought (D3) had developed in several counties in the Panhandle. By August 2020, several pockets of severe drought (D2) and extreme drought (D3) had developed in west Texas and the mid-Rio Grande Valley, and abnormally dry (D0) conditions and moderate (D1) conditions had appeared in central Texas. By September 2020, these areas of drought had grown in extent and pockets of exceptional drought (D4) conditions had developed in west Texas and the central Panhandle. By October 2020, much of the drought over central Texas had eased. However, the area under extreme-through-exceptional drought (D3 through D4) conditions had grown in extent in west Texas and the Panhandle. By November 2020, moderate drought (D2) had reappeared in central Texas, pockets of east Texas, and along the upper coast. By early December 2020, the extent of the state under drought conditions



reached a peak, with approximately 96 percent of the state under some category of drought and exceptional drought (D4) covering 13 percent of the state.



By December 2019, 55.31 percent of the state was in some category of drought. At the beginning of December 2020, 95.92 percent of the state was in some category of drought. This was the greatest areal extent under drought from 2019 through 2020 (Figure 3), and the first time since May 2014 that drought conditions covered over 90 percent of the state.

## **Climate Conditions 2019-2020**

After a few relatively drought-free years, drought returned to Texas in 2019-2020 with a vengeance. Unlike, say, 2011, when the entire state was struck by drought at the same time, drought during the past two years moved around the state, affecting different parts of the state at different times. At the close of 2020, according to the US Drought Monitor, the state of Texas was experiencing its worst drought conditions since May 2014.

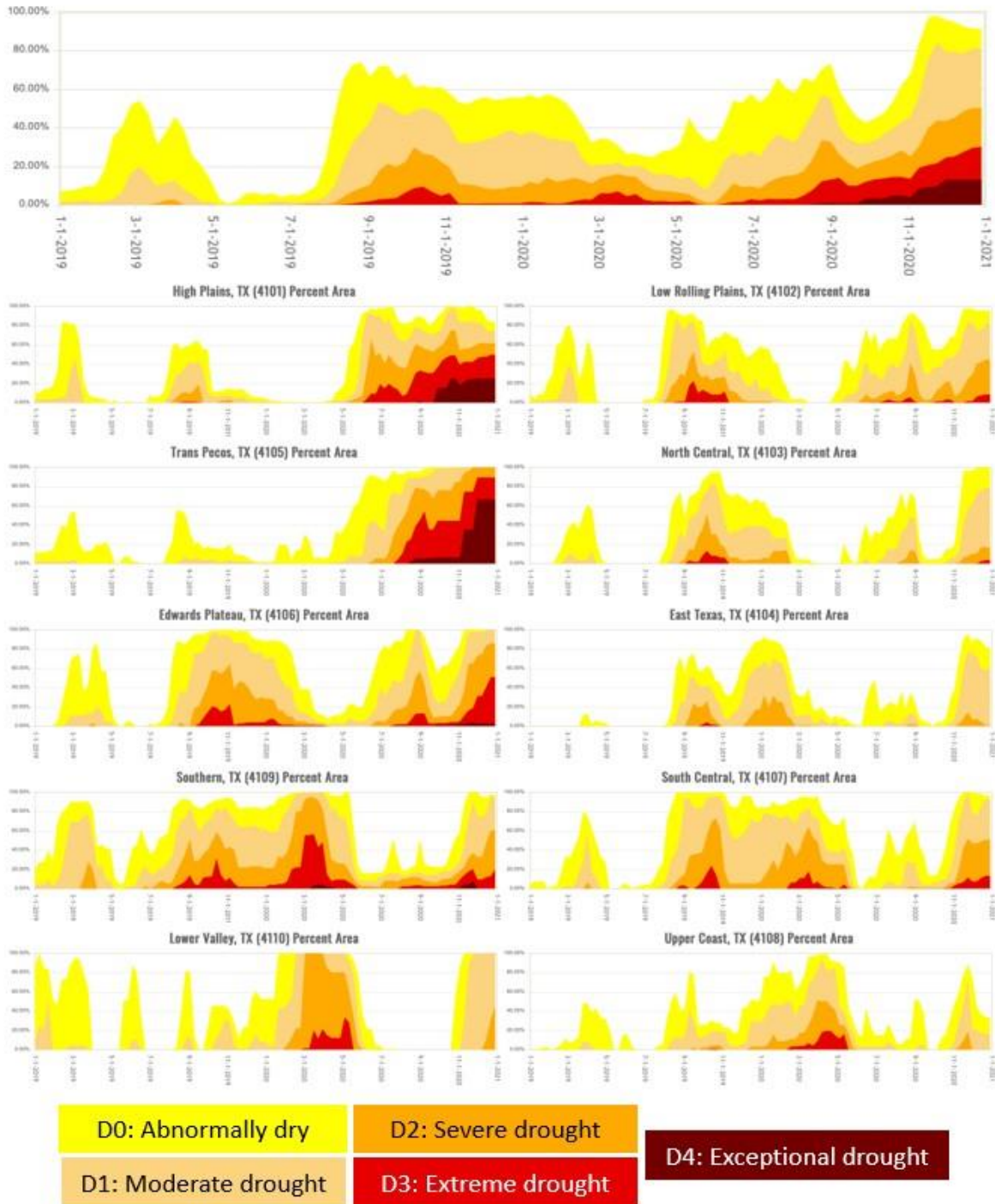
In the first figure, the top graph shows the percentage of Texas affected by abnormal dryness and by varying levels of drought severity. At the beginning of 2019, Texas was almost entirely drought-free, and drought remained isolated until the end of July 2019. During August and September, drought conditions rapidly intensified, and although the extent of drought decreased over the following winter, it began expanding again in June 2020.

The remaining graphs show drought extent in each of the ten Texas climate divisions. The drought in late summer 2019 was worst in central Texas, with substantial areas of extreme drought present in the Low Rolling Plains, Edwards Plateau, South Central Texas, and Southern Texas. Much of those areas saw drought diminish or be eliminated over the winter of 2019-2020, but drought developed or intensified across the southern half of the state. By April 2020, extreme or exceptional drought was present in South Central Texas, Southern Texas, the Upper Coast, and the Lower (Rio Grande) Valley.

The drought in the southern half of the state was nearly eradicated by tropical precipitation in May 2020, but at the same time drought was developing across northern and western Texas. Extreme drought emerged by early June 2020 in the High Plains and by late July in the Trans Pecos and Edwards Plateau climate divisions. Southern Texas never quite managed to get rid of severe drought, which persisted especially within the Del Rio - Uvalde - Laredo triangle. By December 2020, more than half of the Trans Pecos region and much of the High Plains was experiencing exceptional drought conditions.

At every long-term station from Lubbock to Midland to El Paso, precipitation from 1 April 2020 to 31 December 2020 ranged from driest to fourth driest all-time. This dryness was accompanied by warm temperatures: just about all of southern and western Texas experienced 2020 temperatures that were among the ten warmest years all-time. The combination of low precipitation and high evaporation produced a short-term drought that by many measures was the second worst on record across much of the area, exceeded only by the 2011 drought.

## Texas Percent Area



The Texas drought developed under large-scale weather conditions that largely favored above-normal precipitation. The 2018-2019 winter featured a weak El Niño, and the 2019-2020 winter featured a marginal El Niño. El Niño tends to favor wet conditions during the cooler half of the year, and indeed most of the state received above-normal precipitation during the 2018-2019 winter. The influence of the weaker 2019-2020 was correspondingly small, with rainfall across the state averaging near normal. In keeping with the El Niño conditions, the winters of 2018-2019 and 2019-2020 were mainly times of drought retreat rather than drought expansion, except for southern Texas in early 2020.

The extreme drought conditions now present in Texas developed mostly since May 2020. The period June-September is one in which global sea surface temperature patterns such as El Niño have relatively little impact on rainfall across the state. So drought development came as a surprise. Texas was not alone in drought development: the southwestern monsoon failed across Arizona and New Mexico as well, leading to exceptional drought across much of those states and leaving almost no water in New Mexico's Elephant Butte Reservoir along the Rio Grande.

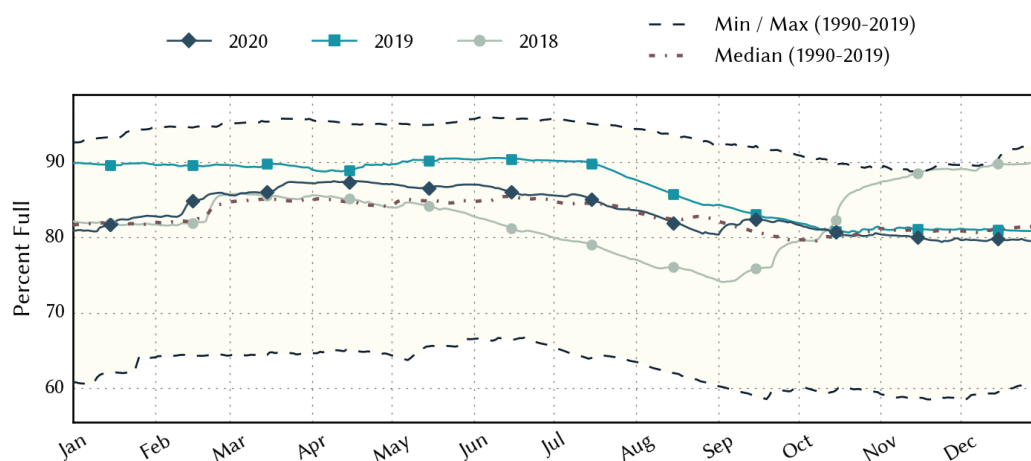
## **Outlook for 2021**

By late 2020, a moderately strong La Niña was firmly in place. The opposite of El Niño, La Niña tends to lead to drier than normal conditions across Texas from late fall through early spring. In this instance, La Niña helped to intensify a drought that had already developed. The La Niña is expected to persist through spring 2021, so the present drought conditions are also expected to persist or intensify.

The last time La Niña was this strong was in the winter of 2010-2011, when a very strong La Niña contributed to the development of the 2011 drought. La Niña doesn't get all the blame; the lack of rainfall from late spring through summer was largely attributable to bad luck with the weather. But it is worth noting that the extensive drought conditions already present in Texas at the end of 2020 were not achieved in the 2011 drought until March 2011. While the present drought is not expected to be as bad as the one in 2011, such a prospect cannot be ruled out at this time.

## Reservoir Storage

In January 2019, statewide reservoir conservation storage was around 90 percent (Figure 4, light blue line with square) and was much above average (median value, depicted by dashed and dotted line) conditions for that time of year. Conservation storage continued to stay slightly above average throughout the year until mid-October 2019 when it decreased to average conditions and remained thus through end-December 2019. In January 2020, statewide reservoir conservation storage was slightly below average conditions (dark blue line with diamond). It increased to slightly above average in March, then lowered to average conditions in mid-June 2020, remained at average conditions through mid-August 2020, and dropped to below average conditions from mid-August through mid-September 2020. Conservation storage increased to above average in mid-September and remained thus through mid-October. Thereafter, conservation storage dropped to slightly below average and remained at around 80 percent through end-December 2020.



**Figure 4:** Statewide reservoir conservation storage for 2020 (dark blue line with diamond) and 2019 (light blue line with square) (source: [www.waterdatafortexas.org/reservoirs/statewide](http://www.waterdatafortexas.org/reservoirs/statewide))



# **Drought Impacts Across Texas**

**Drought can be devastating; water supplies dry up, crops, fish and wildlife are adversely affected and recreational opportunities are diminished, decreasing revenue streams and impacting economic stability of affected communities. This section provides information on drought impacts and mitigation activities for 2019 – 2020.**

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## **Agricultural Impacts**

While 2020 was not a year in which the impact of drought was highly visible, drought did build throughout the year with some likely impacts on agriculture. By the end of 2020, 91.2 percent of the state was in some level of drought classification, according to the U.S. Drought Monitor. The following are some notes on drought in 2020 by agricultural sector.

### **Livestock**

While drought spread across the state, it was most severe in far West Texas and the Southern Plains. Relatively speaking, those areas have fewer cows than other regions of the state. Anecdotally, based on conversations with ranchers, there has likely been some early culling of beef cows due to drought. Many counties of the state have been eligible for USDA, FSA Livestock Forage Program (LFP) payments based on drought severity.

Expect the situation will change quickly if drought does not improve as we get into Spring and early Summer. It is also important to recognize some context for cattle numbers. Texas had 4.57 million beef cows on January 1, 2020. That is 570,000 fewer than on January 1, 2010. Depending on each ranch's situation, fewer cows may lead to less pressure to reduce cattle or at least provide a little flexibility.

### **Crops**

Timing is one of the important considerations in drought impacts in agriculture. The drought largely built from West to East meaning that crops in far West Texas were more impacted. Generally speaking, a lot of Central Texas and Coastal Bend areas got their crops in before the worst hit. There are, most likely, exceptions to this generalization around the state. State-wide average yields per harvested acre were higher in 2020 for corn and grain sorghum than in 2019. Cotton acre abandonment totaled 40-50 percent of the total acres planted in 2020. Abandoned acres were mostly in dryland (non-irrigated) cotton acres and those acres largely failed due to drought.

## Fish and Wildlife Impacts

For 2019-2020, conditions for fish and wildlife resources across much of the state were generally satisfactory. Widespread and timely rains promoted adequate to above average vegetation that provided food and cover for many economically, ecologically, and recreationally important wildlife species. Due to drought, habitat conditions were in decline in late 2019. Spring rains in 2020 helped many areas of the state, including south Texas, the Edwards Plateau and west Texas, recover from dry conditions and led to the production of quality forbs, grasses, and mast. The improved habitat conditions resulted in increased recruitment and populations of white-tailed deer in most areas of the state. For pronghorn, good winter and early spring rains in 2019-2020 in Hudspeth County caused a higher than normal fawn crop, though the remainder of the Trans-Pecos region had fawn crops that were around average to below average due to a dry spring. Throughout the state, conditions were generally favorable for wild turkey, mourning dove, and waterfowl. Spring conditions were promising for bobwhite quail in 2019 and 2020. However, hot dry conditions in summer interrupted and shortened the nesting season. While summer and hurricane related rainfall improved conditions in the South Texas Plains in 2020, a dry spring and summer in the Great Plains reduced habitat quality and impacted quail numbers.

Widespread rains in late 2018 boosted the levels of monitored water supply reservoirs to almost 90% by the start of 2019. By the end of 2020, monitored water supply reservoir levels had declined to approximately 80% - about one and a half percentage points below normal for December. Reservoir levels were periodically low in some areas, impacting the availability and quality of angling and other recreational activities. Streamflow generally remained near or above normal across the state for the biennium, though there were times of exceptionally low flows in west Texas corresponding to dry summer months. Blooms of golden algae and associated fish kills were geographically widespread and occurred sporadically from late winter through mid-summer in both years. Minor to moderate blooms were detected in parts of the Red, Brazos, Colorado, and Rio Grande basins with limited severity. Summer blooms of blue-green algae (cyanobacteria) in central Texas in 2019 and 2020 led to the closure of several waterbodies due to potential health effects to humans and pets. Overall, concerns remain about the availability of water for wildlife and waterfowl, particularly during times of drought. However, in many instances during the biennium, the timing and quantity of precipitation events mitigated severe impacts to fish and wildlife resources.

While not directly related to drought, zebra mussels increased their distribution into more of the state's bodies of water. The spread of the prolific bivalve could threaten native species, water treatment and distribution systems, and the ability to address water supply needs during drought due to infrastructure impacts. As of January 2021, the Texas Parks and Wildlife Department reports that 23 Texas lakes in five river basins can be classified as fully infested with zebra mussels, meaning the water body has an established, reproducing population: Austin, Belton, Bridgeport, Buchanan, Canyon, Dean Gilbert, Eagle Mountain, Georgetown, Granger, Grapevine, Lady Bird, Lewisville, Livingston, Lyndon B. Johnson, Marble

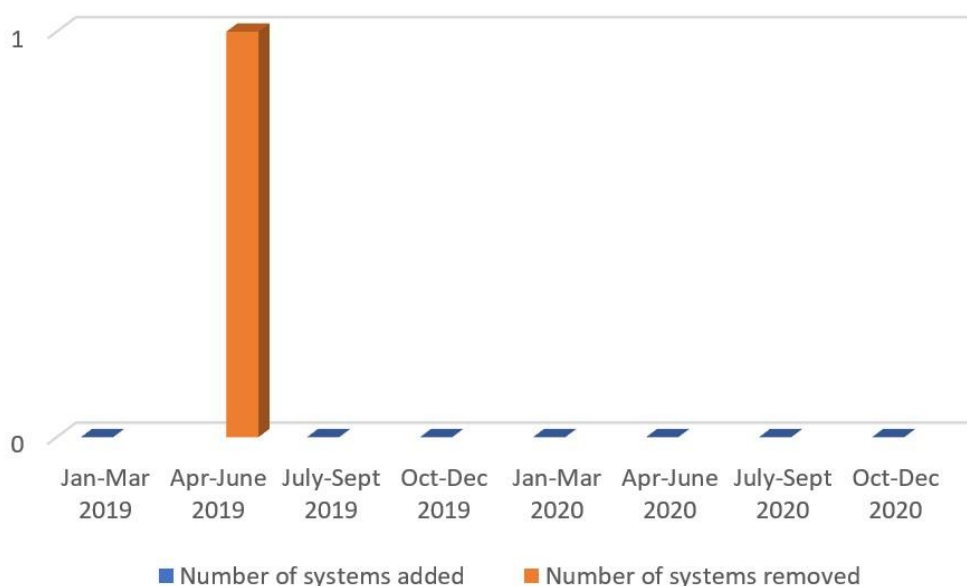
Falls, O.H. Ivie, Pflugerville, Randell, Ray Roberts, Richland Chambers, Stillhouse Hollow, Texoma, and Travis. Zebra mussels or their larvae have been detected on more than one occasion in Lakes Dunlap, Fishing Hole, Lavon, McQueeney, Placid, Walter E. Long, and Worth. So far there is no evidence of a reproducing population in these lakes. River reaches downstream of infested lakes, including portions of the Colorado, Guadalupe, Lampasas, Leon, Little, Red, and Trinity rivers, are also positive for zebra mussels. Zebra mussels or their larvae have been found once in Lake Ray Hubbard.

## Emergency Drinking Water Task Force (EDWT) Engagement

The Emergency Drinking Water Task Force, co-chaired by the Texas Division of Emergency Management (TDEM) and The Texas Commission on Environmental Quality (TCEQ), is a subcommittee of the Drought Preparedness Council. The EDWT tracks water systems that self-identify as having 180 days or less of potable water.

The EDWT, in conjunction with task force partners, supports water systems' efforts to secure dependable sources of water. This assistance includes help locating funding sources, providing technical assistance and assisting with grant and loan applications.

Figure 2 shows the number of water providers added to, or removed from, the 180-day high priority list during the reporting period. As shown, there were no additions to the list over the two-year period, and the only removal was in the 2nd quarter of 2019.



**Figure 2: Graph showing water providers added or removed from the 180 day high priority list as described above.**



# Authority

Strategic guidance and authorities governing the enactment and implementation of this report are summarized below.

Source	Relevance	Link
<b>Texas Government Code Section 418.042</b>	Describes provisions TDEM must keep current in the comprehensive state emergency management plan.	<a href="http://www.statutes.legis.state.tx.us/Docs/GV/htm/GV.418.htm#418.050">http://www.statutes.legis.state.tx.us/Docs/GV/htm/GV.418.htm#418.050</a>
<b>Texas Water Code Title 2. Water Administration Subtitle C. Water development</b>	Directs TDEM, through the State Drought Manager and the Drought Preparedness Council, to develop and implement a comprehensive state drought preparedness plan for mitigating the effects of drought in the state and periodically update the plan. The plan is separate from the State Water Plan.	<a href="http://www.statutes.legis.state.tx.us/Docs/WA/htm/WA.16.htm">http://www.statutes.legis.state.tx.us/Docs/WA/htm/WA.16.htm</a>
<b>Texas Water Code Title 2. Water Administration Subtitle C. Water development Sec 16.0551 C</b>	Directs the state drought manager to develop an information and communications network to forecast and inform interested parties and the public of the potential for drought.	<a href="http://www.statutes.legis.state.tx.us/Docs/WA/htm/WA.16.htm">http://www.statutes.legis.state.tx.us/Docs/WA/htm/WA.16.htm</a>
<b>House Bill 2660 76<sup>th</sup> Legislature Session</b>	Establishes the State Drought Preparedness Council, designates the state agencies that serve on the council, names the chief of TDEM as the state drought manager and outlines the overall responsibilities of the council.	<a href="http://www.legis.state.tx.us/tlodocs/76R/analysis/html/HB02660E.htm">http://www.legis.state.tx.us/tlodocs/76R/analysis/html/HB02660E.htm</a>
<b>Senate Bill 662 83<sup>rd</sup> Texas Legislature Session</b>	Identifies the members of the Drought Preparedness Council.	<a href="http://www.legis.state.tx.us/tlodocs/83R/analysis/html/SB00662I.HTM">http://www.legis.state.tx.us/tlodocs/83R/analysis/html/SB00662I.HTM</a>
<b>Texas Administrative Code Title 30 Chapter 288.30</b>	Sets guidelines and requirements for water systems to have drought contingency plans and water contingency plans.	<a href="http://info.sos.state.tx.us/pls/pub/readtac\$ext.TacPage?sl=R&amp;app=9&amp;p_dir=&amp;p_rloc=&amp;p_tloc=&amp;p_ploc=&amp;pg=1&amp;p_tac=&amp;ti=30&amp;pt=1&amp;ch=288&amp;rl=30">http://info.sos.state.tx.us/pls/pub/readtac\$ext.TacPage?sl=R&amp;app=9&amp;p_dir=&amp;p_rloc=&amp;p_tloc=&amp;p_ploc=&amp;pg=1&amp;p_tac=&amp;ti=30&amp;pt=1&amp;ch=288&amp;rl=30</a>

# Drought Preparedness Council Members

This section provides a list of organizations and individuals appointed to the Drought Preparedness Council.

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Agency	Name
<b>Texas Division of Emergency Management</b>	Nim Kidd
<b>Texas Water Development Board</b>	Sam Hermitte
<b>Texas Commission of Environmental Quality</b>	Kenneth Coonrod
<b>Texas State Soil and Water Conservation Board</b>	Steven Bednarz
<b>Texas Department of Agriculture</b>	David Villarreal
<b>Texas A&amp;M Agri-life Extension Service</b>	Dr. Mark McFarland
<b>Texas Parks and Wildlife Department</b>	David Brasby
<b>Texas Department of Transportation</b>	Brian Dodge
<b>Texas A&amp;M Forest Service</b>	Scott Breit
<b>Texas Department of State Health Services</b>	Cliff Lindell
<b>Economic Development and Tourism</b>	Nicole Ryf
<b>Texas Alliance and Groundwater Districts</b>	David A. Van Dresar
<b>Office of the State Climatologist</b>	Dr. John Nielsen-Gammon
<b>Public Utility Commission</b>	Shawn Hazard
<b>Electric Reliability Council of Texas</b>	Warren Lasher
<b>Member</b>	Thomas Martine
<b>Member</b>	William Masterson
<b>Member</b>	Oscar Fogle

## **For More Information**

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